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(54) MULTI-LANGUAGE RECORDING MEDIUM AND REPRODUCING DEVICE FOR THE SAME

(57) In addition to normal subtitles, easy-to-see large letters, easy-to-read letters intended for children, and comments are available on the screen in the same language as that used in subtitles.

An optical disk has a management area and a data area. In the data area, main picture information, sub-picture information used to construct streams in different languages, and audio information have been recorded. In the management area, attribute information used to identify each piece of sub-picture information on the streams has been recorded. The attribute information includes language code indicating kinds of language. The language code is supplemented with a code extension indicating differences in the size of characters and/or description obtained from the sub-picture information. Sub-pictures include a stream of easy-to-see large letters and a stream of easy-to-read letters intended for children.

CODE EXTENSION TABLE FOR SUB-PICTURE STREAMS

8BITS CODE VALUE	DESCRIPTION
00h	NONE
01h	CAPTION IN STANDARD-SIZED CHARACTERS
02h	CAPTION IN LARGE-SIZED CHARACTERS
03h	CAPTION FOR CHILDREN
04h	RESERVED
05h	CLOSED CAPTION IN STANDARD-SIZED CHARACTERS
06h	CLOSED CAPTION IN LARGE-SIZED CHARACTERS
07h	CLOSED CAPTION FOR CHILDREN
08h	RESERVED
09h	MANDATORY CAPTION
0Ah	RESERVED
0Bh	RESERVED
0Ch	RESERVED
0Dh	DIRECTOR'S COMMENTS IN STANDARD-SIZED CHARACTERS
0Eh	DIRECTOR'S COMMENTS IN LARGE SIZE
0Fh	DIRECTOR'S COMMENTS FOR CHILDREN
10h~7Fh	RESERVED
80h~FFh	DEFINITIONS MADE BY PRODUCER

FIG. 10

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Description

Technical Field

This invention relates to a system for recording information on a recording medium, such as an optical disk, or reproducing the information recorded on the medium, and more particularly to a recording medium on which multilingual information has been recorded and a reproducing system for the recording medium.

Background Art

In recent years, optical disks on which compressed video information, sub-picture information, and audio information are recorded have been developed. The optical disks have the sub-picture information and audio information recorded on them in various languages. In playback, any one of the languages can be chosen by an application program running on the reproducing system. The sub-picture information includes subtitles and captions added to movies. Such an optical disk can be produced for use in many countries where people speak different languages.

When the sub-picture information is reproduced and subtitles appear on the display, it sometimes seems to the viewer that the letters are too small to read or the words are too difficult to understand, because the language and the vocabulary have been determined by the producer beforehand.

Disclosure of Invention

Accordingly, an object of the present invention is to provide a multilingual recording medium that enables users to make a selection from not only normal subtitles (in the standard language and standard size) but also easy-to-see large letters, plain words intended for children, and even commentary in the same language and a reproducing system for the multilingual recording medium.

Another object of the present invention is to provide a multilingual recording medium that enables users to make a selection from not only normal speech in a language but also plain speech intended for children, and even commentarial speech in the same language and a reproducing system for the multilingual recording medium.

The foregoing objects are accomplished by providing a recording medium having a data area in which main picturpe information, sub-picture information used to construct streams, and audio information have been recorded and a management area in which attribute information used to identify the streams has been recorded, the multilingual recording medium characterized in that the attribute information is supplemented with specific code indicating kinds of language and a code extension indicating differences in the size of characters and/or description in the same language, and the data area has a stream of the sub-picture information determined by the specific code and code extension recorded in it.

Furthermore, a recording medium of the present invention is a recording medium having a data area in which main picture information, sub-picture information used to construct sub-picture streams, and audio information used to construct audio streams have been recorded and a management area in which attribute information used to identify the sub-picture streams and the audio streams have been recorded, the recording medium characterized in that,

> the attribute information is supplemented with sub-picture specific code indicating kinds of language used in sub-pictures and a sub-picture code extension indicating differences in the size of characters and/or description in the same language, and with audio specific code indicating kinds of language used in audio and an audio code extension indicating differences in description in the same language, and
>
> the data area has a stream of the sub-picture information determined by the sub-picture specific code and sub-picture code extension and the audio stream determined by the audio specific code and audio code extension recorded in it.

Furthermore, a reproducing system of the present invention is characterized by comprising: means for reading the data from the management area, recognizing the contents of the attribute information, tabulating pieces of information on the streams, and displaying the contents of each stream on playback in the form of a menu screen; and playback means for reproducing the sub-picture information corresponding to the selected stream, when there has been an operation input to the effect that one of the pieces of information on the streams displayed on the menu screen will be chosen.

Still furthermore, a reproducing system of the present invention is characterized by comprising: means for reading the data from the management area, recognizing the contents of the attribute information, tabulating pieces of information on the sub-picture streams and pieces of information on the audio streams, and displaying the contents of each sub-picture stream and each audio stream on playback in the form of a menu screen; and playback means for reproducing the sub-picture information and audio information corresponding to the selected stream, when there has been an operation input to the effect that one of the pieces of information on the streams displayed on the menu screen will be chosen.

On playback of the information from the recording medium, it is possible to choose and display a different size of characters or a different description in the same language or reproduce a different vocal description in the same language, such as a vocal description with comments.

Brief Description of Drawings

FIG. 1 is an explanatory diagram of an optical disk according to the present invention.

FIG. 2 shows a volume space for the information recorded on the optical disk.

FIG. 3 is a diagram to help explain the structure of the files recorded on the optical disk.

FIG. 4 is a diagram to explain the structure of a video object set recorded on the optical disk.

FIG. 5 is a diagram to help explain a program chain including the program chain information recorded in the video title set information on the optical disk and the video object set to be reproduced.

FIG. 6 is an explanatory diagram showing the structure of the video title set recorded on the optical disk.

FIG. 7 shows the contents of the video title set information management table recorded on the optical disk.

FIG. 8A is an explanatory diagram to help explain the structure of the sub-picture stream attribute table in the video title set information management table.

FIG. 8B is a table to help explain the types of sub-pictures in the sub-picture stream attribute table.

FIG. 9A is a diagram to help explain specific codes in the sub-picture stream attribute table.

FIG. 9B is a diagram to help explain other specific codes in the sub-picture stream attribute table.

FIG. 10 is a table listing code extensions for sub-picture streams.

FIG. 11A is a diagram to help explain an example of sub-picture streams.

FIG. 11B is a diagram to help explain another example of sub-picture streams.

FIG. 12 is a diagram to help explain still another example of sub-picture streams.

FIG. 13 is an explanatory diagram showing the structure of the audio stream attribute table in the video title set information management table.

FIG. 14 is a table listing code extensions for audio streams.

FIG. 15 is a block diagram of a system for reproducing the optical disk.

FIG. 16A shows an example of a menu screen produced by the reproducing system using the optical disk.

FIG. 16B shows another example of a menu screen produced by the reproducing system using the optical disk.

FIG. 17 is a flowchart for an example of the operation of setting a sub-picture stream in the reproducing system.

FIG. 18 shows the structure of a data packet for a sub-picture.

FIG. 19 is a flowchart for an example of the operation of setting an audio stream in the reproducing system.

FIG. 20 is a diagram to help explain another example of a sub-picture stream.

Best Mode of Carrying Out the Invention

Hereinafter, referring to the accompanying drawings, an embodiment of the present invention will be explained.

FIG. 1 schematically shows the recording data structure of an optical disk 100 as an example of an information retaining medium to which the present invention is applicable.

The optical disk 100 is a double-sided laminated disk, each side being able to store, for example, 5 gigabytes of data. There are a large number of tracks beginning at the lead-in area near the center of the disk and continuing to the lead-out area on the outer edge side of the disk. Each track consists of a lot of logical sectors. Each sector stores various types of information (suitably compressed digital data).

FIG. 2 shows a volume space on the optical disk 100.

As shown in FIG. 2, the volume space is made up of a volume and file structure zone, a DVD video zone, and other zones. In the volume and file structure zone, a UDF (Universal Disk Format Specification Revision 1.02) bridge structure is written. The data can be read on a computer complying with a specific standard. The DVD video zone includes a video manager (VMG) and a video title set (VTS). The video manager (VMG) and video title set (VTS) are each composed of more than one file. The video manager (VMG) is information used to control the video title set (VTS).

FIG. 3 shows the structures of the video manager (VMG) and video title set (VTS) in further detail.

The video manager (VMG) includes video manager information (VMGI) serving as control data and a video object set (VMGM_VOBS) serving as data for menu display. It further includes backup video manager information (VMGI) having the same contents as those of the VMGI.

The video title set (VTS) includes video title set information (VTSI) serving as control data, a video object set (VTSM_VOBS) serving as data for menu display, and a video object set (VTSTT_VOBS) for the title of a video title set. The video title set is a video object set for video display. The video title set (VTS) further includes backup video title information (VTSI) having the same contents as those of the VTSI

The video object set (VTSTT_VOBS) for video display consists of more than one cell (Cell). Each cell (Cell) is assigned a cell ID number.

FIG. 4 is a hierarchical representation of the relationship between the video object set (VOBS) and cells and the contents of a cell (Cell). In the DVD reproducing process, video segmentation (e.g., scene changes, angle changes, or story changes) and specific playback are effected cell by cell or in video object units (VOBU) lower than the cells in the level of hierarchy.

The video object set (VOBS) consists of more than one video object (VOB_IDN1 to VOB_IDNi). One video object consists of more than one cell (C_IDN1 to C_IDNj). One cell (Cell) consists of more than one video object unit (VOBU). One object unit (VOBU) consists of one navigation pack (NV_PCK), more than one audio pack (A_PCK), more than one video pack (V_PCK), and more than one sub-picture pack (SP_PCK).

The navigation pack (NV_PCK) is mainly used as control data used to reproduce and display the data in the video object unit to which the pack belongs and control data used to search for data in the video object unit.

The video pack (V_PCK) is main video information and is compressed in accordance with such a standard as the MPEG standard. The sub-picture pack (SP_PCK) is sub-video information that supplements the main picture. The audio pack (A_PCK) is audio information.

FIG. 5 illustrates how a program chain (PGC) controls the order in which the cells (Cells) are reproduced.

Various program chains (PGC#1, PGC#2, PGC#3, ...) have been prepared so that the order of reproducing the data cells can be set in different ways. Therefore, selecting a program chain sets the order of reproducing the cells.

In the program chain information (PGCI), an example of executing program #1 to program #n is shown. In the programs in the figure, the cells specified in (VOB_IDN #s, C_IDN#s+1) in the video object set (VOBS) and those subsequent to these cells are specified in sequence.

FIG. 6 shows video title set information (VTSI) in the video title set (VTS). In the video title set information (VTSI), a video title set program chain information table (VTS_PGCIT) is written. Therefore, when a video object set (VOBS) in one video title set (VTS) is reproduced, the program chain specified by the producer or selected by the user is chosen from the program chains listed in the video title set program chain information table (VTS_PGCIT).

In the VTSI, the following data items are further written:

VTSI_MAT --- A video title set information management table, in which what type of information exists in the video title set and the start address and end address for each piece of information are written.

VTS_PTT_SRPT --- A video title set part-of-title search pointer table, in which title entry points and others are written.

VTSM_PGCI_UT --- A video title set menu program chain information unit talbe, in which a menu for a video title set written in multiple languages is written. Therefore, it is possible to check the menu to see what video title sets are written and what order of palyback is used.

VTS_TMAPT --- A video title set time map table, in which information on the recording position of each VOBU managed in each program chain and specified at regular intervals of a specific number of seconds.

VTSM_C_ADT --- A video title set menu cell address table, in which the start and end addresses for the individual cells constituting a video title set menu are written.

VTSM_VOBU_ADMAP --- A video title set menu video object unit address map, in which the start address for the menu video object unit is written.

With the reproducing system, when a program chain has been selected, the program chain sets the order of reproducing the cells. In playback, NV_PCK included in the video object unit is referred to. NV_PCK has the contents of display, information used to control display timing, and information for data searching. Therefore, on the basis of the information in the NV_PCK talbe, V_PCK is retrieved and decoded. When another pack is retrieved and decoded, A_PCK and SP_PCK in the language specified by the producer or user are retrieved.

FIG. 7 shows the contents of the video title set information management table (VTSI_MAT) of FIG. 6 in detail.

In VTSI_MAT, VTS identification information (VTS_ID) to which the table belongs, the end address for the VTS (VTS_EA), and the end address for the VTSI itself (VTSI_EA) and others are written.

Moreover, in VTSI_MAT, the number of audio streams (VTS_AST_Ns) exist in the VTS to which the table belongs and a table (VTS_AST_ATRT) listing the attributes of the audio streams are further written.

The audio streams include streams in different languages and streams in the same language but differing in the way of expression. Examples of streams in the same language but differing in the way of expression are audio for comments and audio for lines. These streams are differentiated from each other on the basis of attribute information.

Moreover, in VTSI_MAT, sub-picture information is further written.

Specifically, the number of sub-picture streams (VTS_SPST_Ns) existing in the VTS to which the table belongs and a table (VTS_SPST_ATRT) listing the attributes of the sub-pictures are written.

The sub-picture streams include streams in different languages and streams in the same language but differing in the way of expression. Examples of streams in the same language but differing in the way of expression are sub-pictures for comments and sub-pictures for lines. These streams are differentiated from each other on the basis of attribute information.

As described above, the optical disk 100 has the management area and the data area. In the management area, management information used to process various types of data recorded in the data area has been defined.

As management information, the types and attributes of data recorded in the data area have been defined. When the data recorded in the data area is related to movies (sound, pictures, and sub-pictures (subtitle pictures)), the management information indicates that the data recorded in the data area is related to movies and what language has been used in the sub-pictures (subtitle pictures). The languages used in the subtitles include English, Japanese, German, and Chinese.

As described above, the optical disk 100 of the present invention has not only the main picture information but also the sub-picture information and audio information recorded on it. The main pictures are compressed by, for example, the MPEG scheme and are divided into packets and recorded on the disk. The sub-pictures are produced in a system completely independent of the system related to the main pictures. The sub-pictures are compressed by, for example, the run-length scheme. The sub-picture information includes information in various languages and can be available in any one of the languages. The sub-picture information in the selected language is superimposed on the main picture. To realize this, the sub-picture information is encoded and decoded in a system independent of the system related to the main pictures, which makes it easy to handle the sub-pictures. Each sub-picture pack is assigned a stream ID used to differentiate the pack from the main pictures and audio information. The sub-picture packet in the sub-picture pack is assigned a sub-stream ID. The language and others can be identified by the sub-picture attributes (VTS_SPST_ATR) in the sub-picture attribute table (VTS_SPST_ATRT) corresponding to the sub-stream ID. The same is true for the audio information. The audio information is encoded and decoded in a system completely independent of the main pictures and sub-pictures.

The optical disk of the present invention is characterized by the definition of the attribute of a sub-picture and the contents of the sub-picture recorded under the definition.

Hereinafter, the definition of the types of sub-picture will be explained by reference to FIG. 8.

FIG. 8A shows the format used in writing the attribute of a sub-picture. That is, FIG. 8A shows the contents of VTS_SPST_ATRT of FIG. 7.

Hereinafter, information on the contents is referred to as language code. The language code consists of six bytes, or a first to a six byte (B1 to B6). The table is provided for each stream of sub-pictures. The coding mode in the first-byte (B1) indicates which mode the sub-picture has been processed in. For example, the processing mode includes run-length compression. In the first-byte (B1), the last two bits contain data indicating the type of sub-picture. The type of sub-picture represents whether language code is present or absent. Namely, as shown in FIG. 8B, "00" means that no language has been determined and "10" means that a language has been determined. When no language has been determined, the sub-picture may be a figure. The third byte (B3) and the fourth byte (B4) represent the kind of language. The data items for identifying the kind of language are referred to as specific codes. The specific codes are composed of high-order bits and low-order bits. They are codes representing the kind of language, such as Japanese (ja), English (en), German (de), French (fr), or Chinese (zh). The high-order bits indicate the first characters and the low-order bits represent the subsequent characters. When such a kind of language has been represented, the sub-picture has been written in the form of data in one language determined in ISO-639 (see the table of FIG. 9A).

In a case where a language not determined in ISO-639 has been used, when "FFh" is specified in the third byte (B3) and, for example, "00h" is specified in the fourth byte (B4) as shown in the table of FIG. 9B, this means that Taiwanese is used. In this state, "01h" is specified in the fourth byte, this means that Cantonese is used.

Furthermore, in the sixth byte (B6) of FIG. 8A, a code extension is written.

FIG. 10 shows an example of the contents of the code extension.

Specifically, in the contents of the sixth byte (B6), 00h means that no language has been determined, 02h means that a caption in standard-sized characters is present, 02h means a caption in large-sized characters is present, and 03h means that a caption intended for children is present. Furthermore, 05 means that a closed caption in standard-sized characters is present, 06h means that a closed caption in large-sized characters, and 07h means that a closed caption intended for children.

Moreover, 09h means that there is a mandatory caption. When the code has been written as a specific code extension, the sub-picture to which the code belongs is given priority in the picture output process.

Additionally, 0Dh means that a director's comment in standard-sized characters is present, 0Eh means that a director's comment in large-sized characters, and 0Fh means that a director comment indented for children is present. In 80h to FFh, definitions made by the producer are written.

FIG. 11A and FIG. 11B show examples of sub-picture streams that can be reproduced when an optical disk having the above-described management information is played on the reproducing system.

FIG. 11A shows an example of an optical disk that allows users to choose one of four sub-picture streams. The table in FIG. 11A can also be seen in the form of a menu picture.

Stream No. 0 is an example in which "language present" is determined for type in the first byte (B1), "en" (i.e., English) is determined in the third and fourth bytes (B3) and (B4), and "01h" (standard-sized characters) is determined for a code extension in the sixth byte (B6). Stream No. 1 is an example in which "language present" is determined for type in the first byte (B1), "en" (i.e., English) is determined in the third and fourth bytes (B3) and (B4), and "02h" (large-sized characters) is determined for a code extension in the sixth byte (B6).

Stream No. 2 is an example in which "language present" is determined for type in the first byte (B1), "ja" (i.e., Japanese) is determined in the third and fourth bytes (B3) and (B4), and "01h" (standard-sized characters) is determined for a code extension in the sixth byte (B6). Stream No. 3 is an example in which "language present" is determined for type in the first byte (B1), "ja" (i.e., Japanese) is determined in the third and fourth bytes (B3) and (B4), and "02h" (large-sized characters) is determined for a code extension in the sixth byte (B6).

Now, suppose an optical disk of the present invention is loaded into the reproducing system and stream No. 3 is chosen and reproduced. As sub-pictures (subtitles) to movies, large-sized Japanese characters also appear on the screen. The reproducing system has the function of storing the determined code for the channel currently being reproduced. In the case of stream No. 3, code "10" representing "language present" as type, code "ja" determined in the third and fourth bytes (B3) and (B4), and code extension "02h" determined in the sixth byte (B6) are stored by the function. The function makes it possible to make effective use of the stored information and reduce the operational burden on the operator, when the information on a subsequent optical disk is reproduced or when another picture is chosen on the same optical disk.

The table of FIG. 11B lists language codes determined in the management information for a movie different from the above movie.

For example, when another recorded movie has been chosen on the same optical disk, or when a movie on another optical disk is played back continuously, language codes as shown in FIG. 11B may have been determined in the management information for the movie.

Stream No. 0 is an example in which "language present" is determined for type in the first byte (B1), "ja" (Japanese) is determined in the third and fourth bytes (B3) and (B4), and "01h" (standard-sized characters) is determined for a code extension in the sixth byte (B6). Stream No. 1 is an example in which "language present" is determined for type in the first byte (B1), "en" (English) is determined in the third and fourth bytes (B3) and (B4), and "01h" (standard-sized characters) is determined for a code extension in the sixth byte (B6).

Stream No. 2 is an example in which "language present" is determined for type in the first byte (B1), "ja" (Japanese) is determined in the third and fourth bytes (B3) and (B4), and "02h" (large-sized characters) is determined for a code extension in the sixth byte (B6). Stream No. 3 is an example in which "language present" is determined for type in the first byte (B1), "ja" is determined in the third and fourth bytes (B3) and (B4), and "03h" (a caption intended for children) is determined for a code extension in the sixth byte (B6).

Now, suppose an optical disk having streams as shown in FIG. 11A is played and stream No. 3 is reproduced. As described above, the reproducing system stores the determined code for each stream (in this case, stream No. 3). Therefore, the reproducing system stores code "10" representing "language present" as type, code "ja" determined in the third and fourth bytes (B3) and (B4), and code extension "02h" determined in the sixth byte (B6).

Suppose an optical disk having streams as shown in FIG. 11B is played. By referring to each determined code, the reproducing system searches for a stream in which the same contents have been determined. Stream No. 2 in the table of FIG. 11B corresponds to stream No. 3 in FIG. 11A. The reproducing system automatically sets the stream for the sub-picture in stream No. 2 and reproduces it. Such a learning function of reproducing the same language in the reproducing system makes it easy for the user to operate the system.

FIG. 12 shows another example of the contents of code extensions.

For example, when "language present" is determined for type in the first byte (B1) and "Japanese" is determined in the high-order bits of the third byte and the low-order bits of the four byte, one of 01h, 02h, 03h, 04h, and 05h is written as code extension. When 01h has been written, this means that the sub-picture is formed in standard-sized characters; when 02h is written, this means that the sub-picture is formed in middle-sized characters; when 03h is written, this means that the sub-picture is formed in large-sized characters; when 04h is written, this means that the sub-picture is formed in hiragana characters; and when 05h is written, this means that the sub-picture is formed in katakana characters.

FIG. 12 gives a description of Japanese. The same is true for other languages. For example, such identification codes as standard-sized characters, middle-sized characters, large-sized characters, and typeface (italics) have been written. That is, the contents of the table of code extensions will vary according to the language.

The language codes shown in FIG. 8 are recorded in such a manner that they correspond to the kinds and forms of language. Accordingly, the larger the number of the kinds and forms of language, the larger the number of times that the language codes are recorded.

To verify the language codes defined as described above in the form of a menu, the language codes shown in FIG. 8 are read by the reproducing system, which then displays a language select menu. For example, a menu screen as shown in the table of FIG. 11A or FIG. 11B is displayed. Looking at the menu screen, the user chooses the desired channel and decides on a sub-picture stream.

The menu screen may be recorded in the data area as picture data. It may be produced by decoding the language codes of FIG. 8 in the reproducing system.

The above explanation has been about the code extensions related to sub-pictures.

Code extensions are set not only for sub-picture but also the audio information.

FIG. 13 shows the format used in writing the attributes of audio codes. That is, FIG. 13 shows the contents of VTS_AST_ATRT of FIG. 7. The table contains eight bytes, a first byte to an eighth byte (B1 to B8). The table is provided for each audio channel. In the coding mode in the first byte (B1), which mode the audio channel has been processed in is written. For example, the processing mode includes Dolby AC-3, MPEG-1, MPEG-2, and linear PCM. In the multichannel extension, whether the audio channel is related to another channel is written. For example, whether or not the audio channel is related to a channel in which comments or background sound has been recorded is written. Furthermore, in the audio type, whether or not a language is included in audio is written.

Moreover, in the audio application mode, whether a karaoke mode, a surround mode, or the like is used is written. In the second byte (B2), an identification code for the number of bits for quantization in a quantization mode or a code indicating the presence or absence of dynamic range control data (VRC) is written in an area labeled as quantization/DRC. Also in the second byte, the number of audio channels is written. The way of writing in the third and fourth bytes (B3) and (B4) is the same as in the case of sub-pictures. That is, identification of languages is written in the third and fourth bytes (B3) and (B4).

The application information in the eighth byte (B8) is used when karaoke has been written for an audio channel. Namely, the audio signal has been recorded in the form of Dolby AC-3, MPFG, or linear PCM or in the form of a solo or a duet.

FIG. 14 shows the description of the code extensions in the sixth byte (B6). In FIG. 14, "00h" means that nothing has been determined, "01h" means standard caption, and "02h" means speech indented for visually handicapped persons. Moreover, "03h" and "04h" mean that director's comments, such as commentary or supplementary explanation, are written.

With the optical disk played on the reproducing system, when a speech channel is selected, a language menu appears. After a language has been chosen, an extension service menu will appear, if the above code extensions have been recorded.

FIG. 15 shows the configuration of the reproducing system that reproduces the information from the optical disk.

A disk 100 is placed on a turn table 101, which is rotated by a motor 102. Suppose the playback mode is now on. In this mode, the information recorded on the disk 100 is picked up by a pickup section 103. The pickup section 103 is moved radially over the disk by a pickup drive section 104. The pickup drive section 104 also provides focus control and tracking control of the pickup section 103.

The output of the pickup section 103 is inputted to a demodulation section 201, which demodulates it. The demodulated data is inputted to an error correction section 202. The error-corrected data is inputted to a demultiplexer 203. The demultiplexer 203 separates the data into video information packs, subtitle and character information packs, audio information packs, and control and management information packs. The reason for this is that the subtitle and character information (sub-pictures) and audio information have been recorded on the disk 100 in a manner that corresponds to the video information as described earlier. Because the subtitle and character information and audio information are available in various languages, a language to be decoded is selected. The selection is made under the control of a system control section 204.

The user gives operation instructions to the system control section 204 via an operator section 205.

The video information separated at the demultiplexer 203 is inputted to a video decoder 206, which subjects the video information to a decoding process corresponding to the type of a display unit. For example, the video information is converted into a signal suitable for NTSC, PAL, SECAM, or a wide screen. The sub-pictures separated at the demultiplexer 203 are inputted to a sub-picture processing section 207, which decodes them into subtitles and literal pictures. The video signal decoded at the video decoder 206 is inputted to an adder 208, which adds the video signal to the subtitles and literal pictures (= sub-pictures). The addition output is directed to an output terminal 209. The audio information separated at the demultiplexer 203 is inputted to an audio decoder 211, which decodes the audio information. The decoded signal is directed to an output terminal 212. In addition to the audio decoder 211, the audio processing section has another audio decoder 213, which is capable of reproducing speech in another language and supplying the reproduced speech to an output terminal 214.

Next, explanation will be given as to how a sub-picture stream is reproduced when an optical disk as shown in FIG. 1 is played on the reproducing system. Because sub-pictures in more than one language and sub-pictures in the same language but different in the size of characters have been recorded on the optical disk 100, any sub-picture route can be selected when the reproducing system is started.

When the reproducing system starts playback, the management information on the optical disk is read, demodulated, and error-corrected. The resulting information is then supplied to the system control section 204 via the demultiplexer 203. The system control section 204 reads language codes as shown in FIG. 7 to FIG. 11 and recognizes what languages are available in sub-pictures and what forms each language has.

On the basis of the recognition, the system control section 204 obtains a stream table as shown in FIG. 11.

Then, the system control section 204 displays what types of streams are present on the basis of the stream table. For example, driving a character generator, the system control section displays a menu screen corresponding to the table shown in FIG. 11A or FIG. 11B.

FIG. 16A and FIG. 16B show examples of the menu screen. The menu screen of FIG. 16A corresponds to the table of FIG. 11A. The menu screen means that selecting stream No. 0 causes English subtitles in normal size to appear and that selecting stream No. 1 causes English subtitles in large size to appear. The menu screen also means that selecting stream No. 2 causes Japanese subtitles in standard size to appear and that selecting stream No. 3 causes Japanese subtitles in large size to appear.

The menu screen of FIG. 16B corresponds to the table of FIG. 11B. The menu screen means that selecting stream No. 0 causes Japanese subtitles in standard size to appear and that selecting stream No. 1 causes English subtitles in normal size to appear. The menu screen also means that selecting stream No. 2 causes Japanese subtitles in large size to appear and that selecting stream No. 3 causes Japanese subtitles indented for children to appear. Subtitles intended for children include, for example, subtitles with explanation of terms or in plain terms and subtitles with explanation of scenes or the pronunciation next to characters.

After the menu screen has appeared, the viewer chooses the desired channel by operating the remote control section 205 to appear. This decides a playback stream for the sub-picture.

In the explanation, the system control section 204 reads the language codes recorded in the management section, examines what routes are available in playback streams for sub-pictures on the optical disk currently being played, and displays the menu screen shown in FIG. 16A or FIG. 16B.

The present invention is not limited to this. For instance, with the menu screen itself recorded in the data area under the above definition, when the reproducing system is started, the menu screen may appear automatically as a result of reproducing pictures. When this method is used, the optical disk is used as a ROM. The method is effective when the contents of the recorded information remain unchanged.

FIG. 17 is a flowchart for the operation from when the optical disk is played on the reproducing system until the first subtitle (sub-picture) stream has been determined.

When playback is started at step A1, the management information is read (step A2). Then, the language codes (see FIG. 8A) are recognized at the system control section 204, which creates sub-picture stream tables as shown in FIG. 11A and FIG. 11B. At this point, the contents of the stream are known. Then, it is judged whether or not there is a stream with conditions similar to those for the last reproduced stream (steps A3 to A5). If there is a stream with similar conditions, the present stream will be chosen and playback will be started (step A6). If there is no stream with conditions similar to those for the last reproduced stream, a menu screen (see FIG. 16A and FIG. 16B) for sub-picture streams will be created and displayed (step A7). When the menu screen has appeared, the selection of a stream by the viewer is waited for (step A8). After the waiting time has exceeded a specific period of time, the playback of a previously set stream is started (e.g., the playback of a stream in the same language as that selected in the preceding session is selected) or the first stream arranged as a menu is selected and its playback is started (steps A9 and A10). When the viewer enters a stream selection, the playback of the sub-picture stream for the selected stream is started (step A11).

Furthermore, to perform a process as described in step A5, each condition for the stream currently being reproduced is stored at step A12. Next, it is judged whether or not the viewer has canceled the selection. The reason for this is that the viewer may have chosen the wrong language or a language in the wrong character size by mistake. If the viewer has canceled the selection, control will return to step A7, where the menu screen display mode will be on. If the viewer has not canceled the selection, the process will be ended.

FIG. 18 shows a packet.

The information in the sub-picture is recorded in the data area in the form of a pack train. Specifically, in one pack (SP_PCK), a pack header, a packet header, a sub-stream ID, and sub-picture data are arranged in that order. Referring to the stream ID and the high-order bits in the sub-stream ID, the demultiplexer judges SP_PCK. Then, after a stream to be reproduced has been selected and determined under the control of the system control section 204, the low-order bits in the sub-stream ID of the packet is referred to. Then, the demultiplexer 203 sorts out the packet with the sub-stream ID corresponding to the selected stream and inputs it into the sub-picture processing section 207, which decodes the packet.

The operation of determining a sub-picture stream has been explained above. On the above-described optical disk, an audio stream provided with code extensions has been recorded.

FIG. 19 is a flowchart for the operation from when the optical disk is played on the reproducing system until an audio stream has been determined.

When playback is started at step B1, the management information is read (step B2). Then, the audio language codes (see FIG. 13) are recognized at the system control section 204, which creates an audio stream table. At this point, the contents of the stream are known. Then, it is judged whether or not there is a stream with conditions similar to those for the last reproduced stream (steps B3 to B5). If there is a stream with similar conditions, the present stream will be chosen and playback will be started (step B6). If there is no stream with conditions similar to those for the last reproduced stream, a stream menu screen (not shown) for audio streams will be created and displayed (step B7).

When the menu screen has appeared, the selection of a stream by the viewer is waited for (step B8). After the waiting time has exceeded a specific period of time, the playback of a previously set stream is started (e.g., the playback of a stream in the same language as that selected in the preceding session is started) or the first stream arranged as a menu is selected and its playback is started (steps B9 and B10). When the viewer enters a stream selection, the playback of the audio stream for the selected stream is started (step B11).

Furthermore, to perform a process as described in step B5, each condition for the stream currently being reproduced is stored at step B12. Next, it is judged whether or not the viewer has canceled the selection. The reason for this is that the viewer may have chosen the wrong stream by mistake. If the viewer has canceled the selection, control will return to step B7, where the menu screen display mode will be on. If the viewer has not canceled the selection, the process will be ended.

In the explanation, it seems that the determination of a sub-picture stream and that of an audio stream are made in separate processes. Actually, however, the process of FIG. 17 and that of FIG. 19 are performed in parallel. Then, an audio stream select screen and a sub-picture stream select screen appear as a menu screen.

FIG. 20 shows another example of using the recording medium and reproducing system. The table of FIG. 20 means that selecting stream No. 0 causes English subtitles in normal size to appear and that selecting stream No. 1 causes English subtitles in large-size characters to appear. The table also means that selecting stream No. 2 causes Japanese subtitles in standard size to appear and that selecting stream No. 3 causes Japanese subtitles in large-size characters to appear. The table further means that selecting stream No. 4 causes Japanese subtitles in hiragana characters to appear. Although not shown, the table further means that selecting stream No. 5 causes German subtitles in normal size to appear and that selecting stream No. 6 causes German subtitles in large-sized characters to appear.

With the recording medium and reproducing system, because it is possible to select and display one among not only normal subtitles in a language but also easy-to-see large subtitles, easy-to-read subtitles intended for children, and subtitles with comments in the same language, the usability of the recording medium and reproducing system is improved.

Industrial Applicability

The present invention is applicable to the manufacture and sale of optical disks and to those of recording and reproducing systems for optical disks.

Claims

1. A multilingual recording medium having a data area in which main picture information and sub-picture information used to construct streams have been recorded and a management area in which attribute information used to identify said streams has been recorded, said multilingual recording medium characterized in that

   said attribute information is supplemented with specific code indicating kinds of language and a code extension indicating differences in the size of characters and/or description in the same language, and said data area has said sub-picture information stream determined by said specific code and code extension recorded in it.

2. A multilingual recording medium according to claim 1, characterized in that said code extension is prepared for each of said kinds of language in the form of a table listing differences in the size of characters and/or description.

3. A multilingual recording medium according to claim 1, characterized in that said attribute information further includes language type information indicating whether or not said attribute information includes a code extension.

4. A multilingual recording medium according to claim 1, characterized in that as said sub-picture information, more than one sub-stream used to produce subtitle data belonging to the same stream in the same language but differing in the size of characters or description has been recorded.

5. A reproducing system for a multilingual recording medium having a data area in which main picture information and sub-picture information used to construct streams have been recorded and a management area in which attribute information used to identify said streams has been recorded, said attribute information being supplemented with specific code indicating kinds of language and a code extension indicating differences in the size of characters and/or description, and said data area having said sub-picture information stream determined by said attribute information recorded in it, said reproducing system characterized by comprising:

   means for reading the data from said management area, recognizing the contents of said attribute information, tabulating pieces of information on said streams, and displaying the contents of each stream on playback in the form of a menu screen; and
   playback means for reproducing the sub-picture information corresponding to the selected

stream, when there has been an operation input to the effect that one of the pieces of information on said streams displayed on said menu screen will be chosen.

6. A reproducing system according to claim 5, characterized in that said reproducing means includes storage means for storing information on the attribute of the stream currently being reproduced.

7. A reproducing system according to claim 6, characterized by further comprising means for reading the data from said management area, judging the contents of said attribute information, and recognizing said streams, means for checking to see if said streams recognized include a stream the contents of which are the same as those of the stream constructed on the basis of the attribute information stored in said storage means, and means for automatically starting the playback of the sub-picture information corresponding to the stream, when said streams recognized include a stream the contents of which are the same as those of the stream constructed on the basis of said attribute information stored.

8. A reproducing system according to claim 5, characterized in that said reproducing means includes means for redisplaying said menu screen, when a cancel operation input has been entered.

9. A multilingual recording medium having a data area in which main picture information, sub-picture information used to construct sub-picture streams, and audio information used to construct audio streams have been recorded and a management area in which attribute information used to identify said sub-picture streams and said audio streams has been recorded, said multilingual recording medium characterized in that

said attribute information is supplemented with sub-picture specific code indicating kinds of language used in sub-pictures and a sub-picture code extension indicating differences in the size of characters and/or description in the same language, and

with audio specific code indicating kinds of language used in audio and an audio code extension indicating differences in description in the same language, and

said data area has said sub-picture information stream determined by said sub-picture specific code and sub-picture code extension and

said audio stream determined by said audio specific code and audio code extension recorded in it

10. A multilingual recording medium according to claim 9, characterized in that said sub-picture code extension is prepared for each of said kinds of language in the form of a table listing differences in the size of characters and/or description, and

said audio code extension is prepared for each of said kinds of language in the form of a table listing differences in the description.

11. A multilingual recording medium according to claim 9, characterized in that as said sub-picture information, more than one sub-stream used to produce subtitle data belonging to the same stream in the same language but differing in the size of characters or description has been recorded, and

as said audio information, more than one sub-stream used to produce audio data belonging to the same stream in the same language but differing in description has been recorded.

12. A reproducing system for a multilingual recording medium having a data area in which main picture information, sub-picture information used to construct sub-picture streams, and audio information used to construct audio streams have been recorded and a management area in which attribute information used to identify said sub-picture streams and said audio streams has been recorded,

said attribute information including not only sub-picture specific code indicating kinds of language used in sub-pictures and a sub-picture code extension indicating differences in the size of characters and/or description in the same language but also audio specific code indicating kinds of language used in audio and an audio code extension indicating differences in description in the same language, and

said data area having said sub-picture information stream determined by said sub-picture specific code and sub-picture code extension and said audio stream determined by said audio specific code and audio code extension recorded in it, said reproducing system characterized by comprising:

means for reading the data from said management area, recognizing the contents of said attribute information, tabulating pieces of information on said sub-picture streams and pieces of information on said audio streams, and displaying the contents of each sub-picture stream and each audio stream on playback in the form of a menu screen; and

playback means for reproducing the sub-picture information and audio information corresponding to the selected stream, when there has been an operation input to the effect that one of the pieces of information on said streams displayed on said menu screen will be chosen.

13. A reproducing system according to claim 12, characterized in that said reproducing means further includes:

storage means for storing information on the attribute of the stream currently being reproduced;
means for, when said recording medium has been replaced, reading the data from said management area on said recording medium and recognizing streams on the basis of the contents of the attribute information;
means for checking to see if said streams recognized include a stream the contents of which are the same as those of the stream constructed on the basis of the attribute information stored in said storage means; and
means for automatically starting the playback of the sub-picture information and audio information corresponding to the stream, when said streams recognized include a stream the contents of which are the same as those of the stream constructed on the basis of said attribute information stored.

14. A multilingual recording medium having a data area in which main picture information and audio information used to construct audio streams have been recorded and a management area in which attribute information used to identify said audio streams has been recorded, said multilingual recording medium characterized in that

said attribute information is supplemented with audio specific code indicating kinds of language used in audio and an audio code extension indicating differences in description in the same language, and

said data area has said audio stream determined by said audio specific code and audio code extension recorded in it.

15. A multilingual recording medium according to claim 14, characterized in that said audio code extension is prepared for each of said kinds of language in the form of a table listing differences in description.

16. A multilingual recording medium according to claim 14, characterized in that as said audio information, more than one sub-stream used to produce audio data belonging to the same stream in the same language but differing in description has been recorded.

17. A reproducing system for a multilingual recording medium having a data area in which main picture information and audio information used to construct audio streams have been recorded and a management area in which attribute information used to identify said audio streams has been recorded,

said attribute information including audio specific code indicating kinds of language used in audio and an audio code extension indicating differences in description in the same language, and

said data area having said audio stream determined by said audio specific code and audio code extension recorded in it, said reproducing system characterized by comprising:

means for reading the data from said management area, recognizing the contents of said attribute information, tabulating pieces of information on said audio streams, and displaying the contents of each audio stream on playback in the form of a menu screen; and
playback means for reproducing the audio information corresponding to the selected stream, when there has been an operation input to the effect that one of the pieces of information on said streams displayed on said menu screen will be chosen.

18. A reproducing system according to claim 17, characterized in that said reproducing means further includes:

storage means for storing information on the attribute of the stream currently being reproduced;
means for, when said recording medium has been replaced, reading the data from said management area on said recording medium, and recognizing streams on the basis of the contents of the attribute information;
means for checking to see if said streams recognized include a stream the contents of which are the same as those of the stream constructed on the basis of the attribute information stored in said storage means; and
means for automatically starting the playback of the audio information corresponding to the stream, when said streams recognized include a stream the contents of which are the same as those of the stream constructed on the basis of said attribute information stored.

19. A multilingual recording medium having a data area in which audio information used to construct audio streams has been recorded and a management area in which attribute information used to identify said audio streams has been recorded, said multilingual recording medium characterized in that

said attribute information is supplemented with audio specific code indicating kinds of language used in audio and an audio code extension indicating differences in description in the same language, and

said data area has said audio stream determined by said audio specific code and audio code extension recorded in it.

20. A multilingual recording medium according to claim 19, characterized in that said audio code extension is prepared for each of said kinds of language in the form of a table listing differences in description.

21. A multilingual recording medium according to claim 19, characterized in that as said audio information, more than one sub-stream used to produce audio data belonging to the same stream in the same language but differing in description has been recorded.

22. A reproducing system for a multilingual recording medium having a data area in which audio information used to construct audio streams has been recorded and a management area in which attribute information used to identify said audio streams has been recorded,

said attribute information including audio specific code indicating kinds of language used in audio and an audio code extension indicating differences in description in the same language, and

said data area having said audio stream determined by said audio specific code and audio code extension recorded in it, said reproducing system characterized by comprising:

means for reading the data from said management area, recognizing the contents of said attribute information, tabulating pieces of information on said audio streams, and displaying the contents of each audio stream on playback in the form of a menu screen; and

playback means for reproducing the audio information corresponding to the selected stream, when there has been an operation input to the effect that one of the pieces of information on said streams displayed on said menu screen will be chosen.

23. A reproducing system according to claim 22, characterized in that said reproducing means further includes:

storage means for storing information on the attribute of the stream currently being reproduced;

means for, when said recording medium has been replaced, reading the data from said management area on said recording medium and recognizing streams on the basis of the contents of the attribute information;

means for checking to see if said streams recognized include a stream the contents of which are the same as those of the stream constructed on the basis of the attribute information stored in said storage means; and

means for automatically starting the playback of the audio information corresponding to the stream, when said streams recognized include a stream the contents of which are the same as those of the stream constructed on the basis of said attribute information stored.

24. A multilingual recording medium having a data area in which sub-picture information used to construct sub-picture streams and audio information used to construct audio streams have been recorded and a management area in which attribute information used to identify said sub-picture streams and said audio streams has been recorded, said multilingual recording medium characterized in that

said attribute information is supplemented with sub-picture specific code indicating kinds of language used in sub-pictures and a sub-picture code extension indicating differences in the size of characters and/or in description in the same language and

with audio specific code indicating kinds of language used in audio and an audio code extension indicating differences in description in the same language, and

said data area has said sub-picture information stream determined by said sub-picture specific code and sub-picture code extension and

said audio stream determined by said audio specific code and audio code extension recorded in it.

25. A multilingual recording medium according to claim 24, characterized in that said sub-picture code extension is prepared for each of said kinds of language in the form of a table listing differences in the size of characters and/or description, and

said audio code extension is prepared for each of said kinds of language in the form of a table listing differences in description.

26. A multilingual recording medium according to claim 24, characterized in that as said sub-picture information, more than one sub-stream used to produce subtitle data belonging to the same stream in the same language but differing in the size of characters or description has been recorded, and

as said audio information, more than one sub-stream used to produce audio data belonging to the same stream in the same language but differing in description has been recorded.

27. A reproducing system for a multilingual recording medium having a data area in which sub-picture information used to construct sub-picture streams and audio information used to construct audio streams have been recorded and a management area in which attribute information used to identify said sub-picture streams and said audio streams has been recorded,

said attribute information including not only sub-picture specific code indicating kinds of language used in sub-pictures and a sub-picture code extension indicating differences in the size of characters and/or in description in the same language but also audio specific code indicating kinds of language used in audio and an audio code extension indicating differences in description in the same language, and

said data area having said sub-picture information stream determined by said sub-picture specific code and sub-picture code extension and said audio stream determined by said audio specific code and audio code extension recorded in it, said reproducing system characterized by comprising:

means for reading the data from said management area, recognizing the contents of said attribute information, tabulating pieces of information on said sub-picture streams and pieces of information on said audio streams, and displaying the contents of each sub-picture stream and each audio stream on playback in the form of a menu screen; and
playback means for reproducing the sub-picture information and audio information corresponding to the selected stream, when there has been an operation input to the effect that one of the pieces of information on said streams displayed on said menu screen will be chosen.

28. A reproducing system according to claim 27, characterized in that said reproducing means further includes:

storage means for storing information on the attribute of the stream currently being reproduced;
means for, when said recording medium has been replaced, reading the data from said management area on said recording medium and recognizing streams on the basis of the contents of the attribute information;
means for checking to see if said streams recognized include a stream the contents of which are the same as those of the stream constructed on the basis of the attribute information stored in said storage means; and
means for automatically starting the playback of the sub-picture information and audio information corresponding to the stream, when said streams recognized include a stream the contents of which are the same as those of the stream constructed on the basis of said attribute information stored.

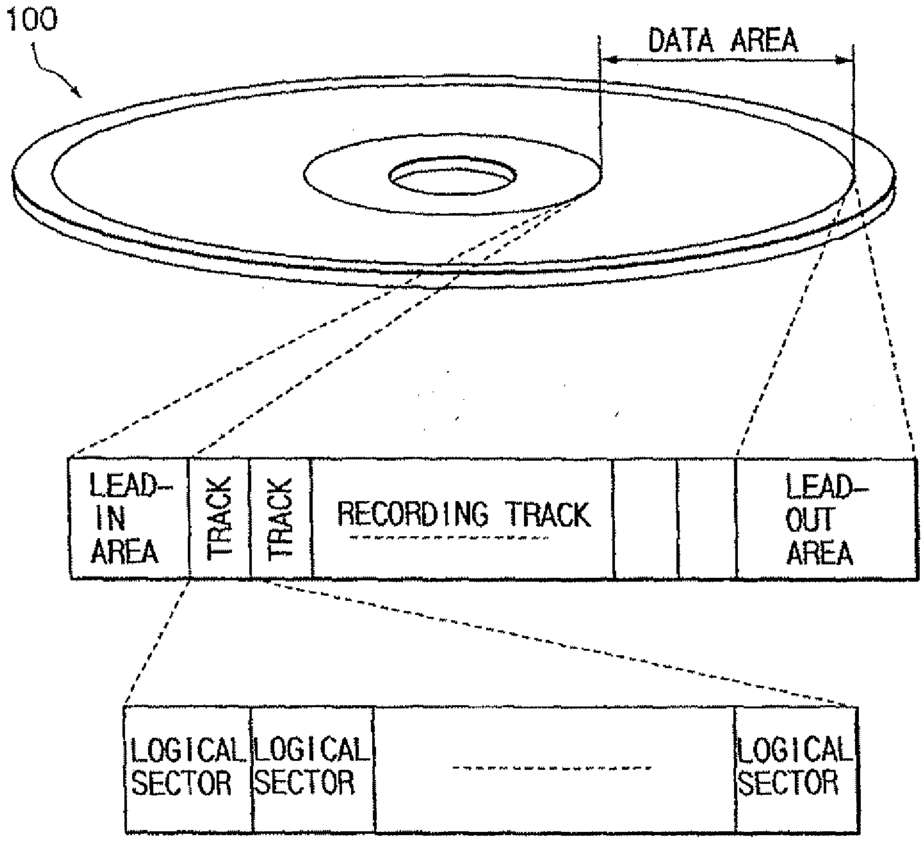

100
DATA AREA
LEAD-IN AREA
TRACK
TRACK
RECORDING TRACK
LEAD-OUT AREA
LOGICAL SECTOR
LOGICAL SECTOR
LOGICAL SECTOR

FIG. 1

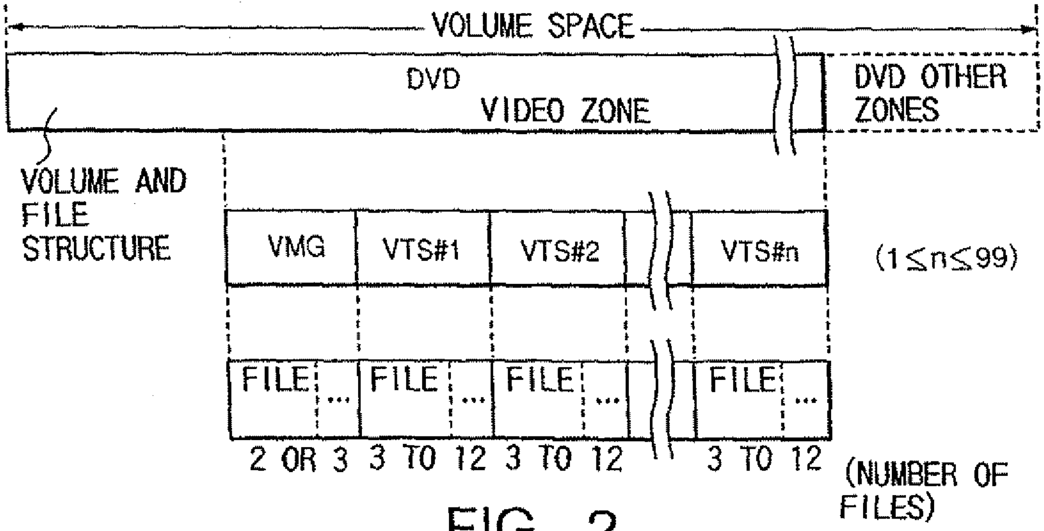

VOLUME SPACE
DVD VIDEO ZONE
DVD OTHER ZONES
VOLUME AND FILE STRUCTURE
VMG
VTS#1
VTS#2
VTS#n
(1≤n≤99)
FILE
FILE
FILE
FILE
2 OR 3
3 TO 12
3 TO 12
3 TO 12
(NUMBER OF FILES)

FIG. 2

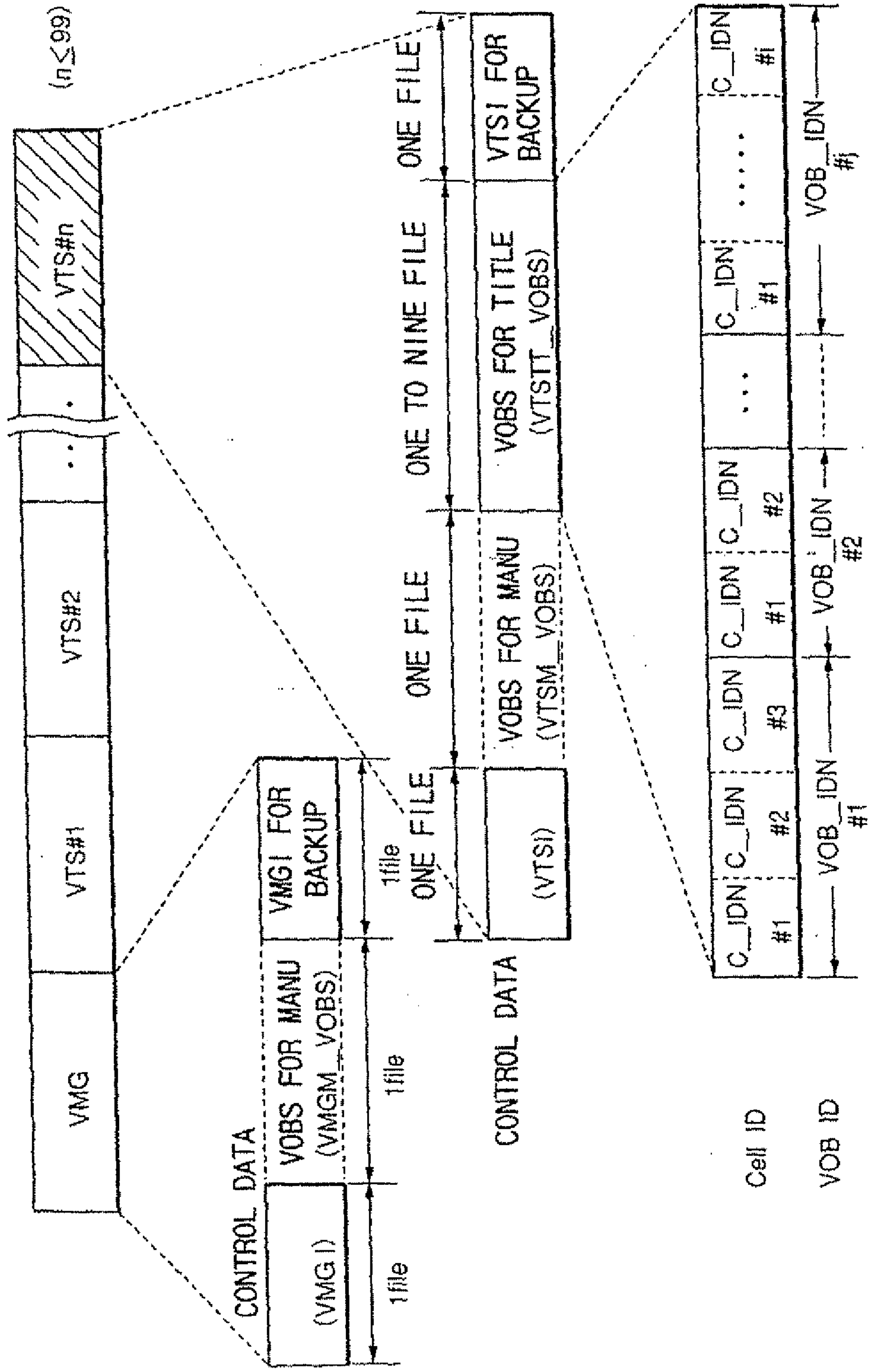

VMG
VTS#1
VTS#2
. . .
VTS#n
(n≤99)
CONTROL DATA
(VMG I)
VOBS FOR MANU
(VMGM_VOBS)
VMGI FOR
BACKUP
1file
1file
1file
CONTROL DATA
(VTSI)
VOBS FOR MANU
(VTSM_VOBS)
VOBS FOR TITLE
(VTSTT_VOBS)
VTSI FOR
BACKUP
ONE FILE
ONE FILE
ONE TO NINE FILE
ONE FILE
Cell ID
VOB ID
C_IDN
#1
C_IDN
#2
C_IDN
#3
C_IDN
#1
C_IDN
#2
. . .
C_IDN
#1
. . . . .
C_IDN
#i
VOB_IDN
#1
VOB_IDN
#2
VOB_IDN
#j

FIG. 3

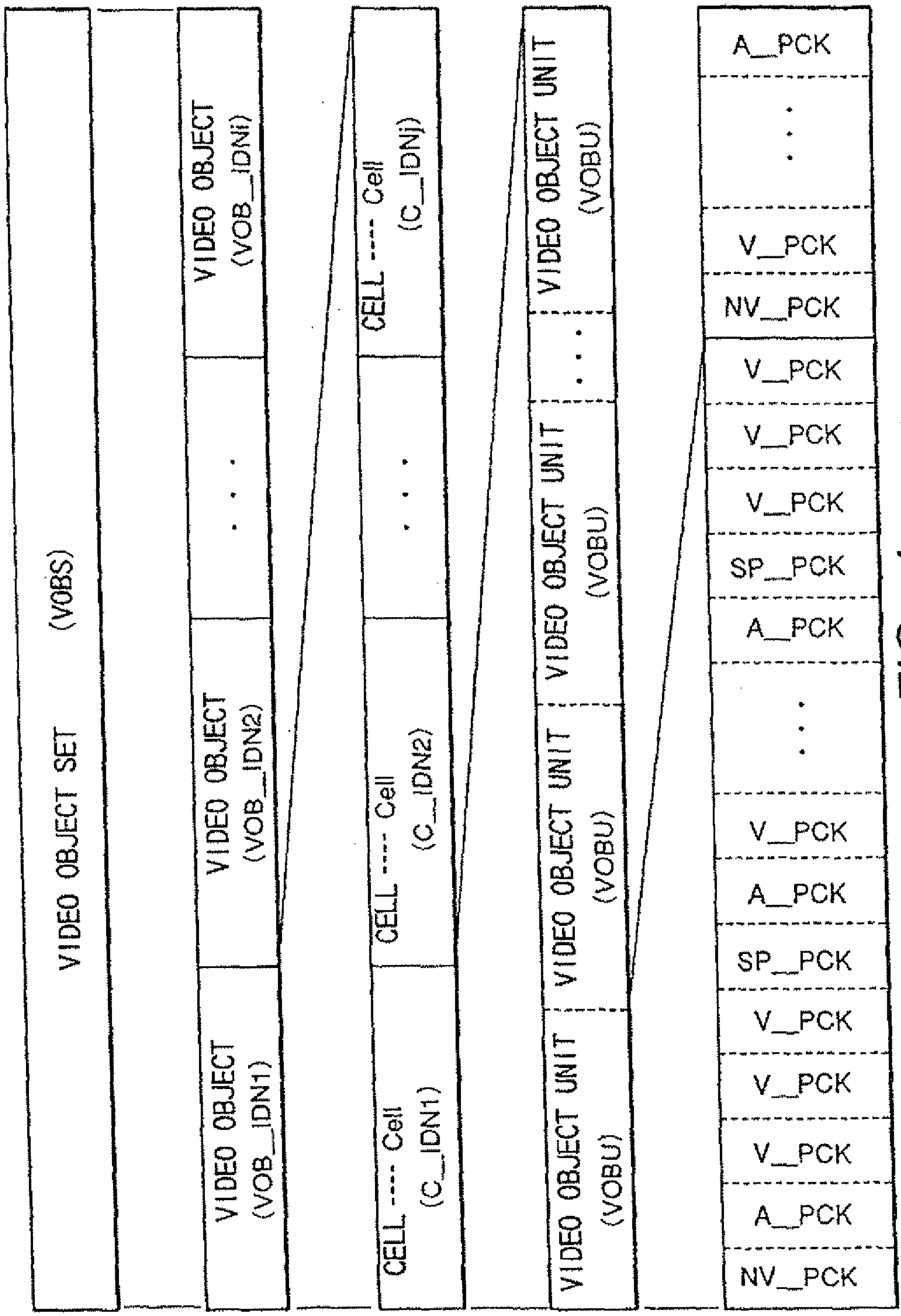

VIDEO OBJECT SET (VOBS)
VIDEO OBJECT (VOB_IDN1)
VIDEO OBJECT (VOB_IDN2)
. . .
VIDEO OBJECT (VOB_IDNi)
CELL ---- Cell (C_IDN1)
CELL ---- Cell (C_IDN2)
. . .
CELL ---- Cell (C_IDNj)
VIDEO OBJECT UNIT (VOBU)
VIDEO OBJECT UNIT (VOBU)
VIDEO OBJECT UNIT (VOBU)
. . .
VIDEO OBJECT UNIT (VOBU)
NV_PCK
A_PCK
V_PCK
V_PCK
V_PCK
SP_PCK
A_PCK
V_PCK
. . .
A_PCK
SP_PCK
V_PCK
V_PCK
V_PCK
NV_PCK
V_PCK
. . .
A_PCK

FIG. 4

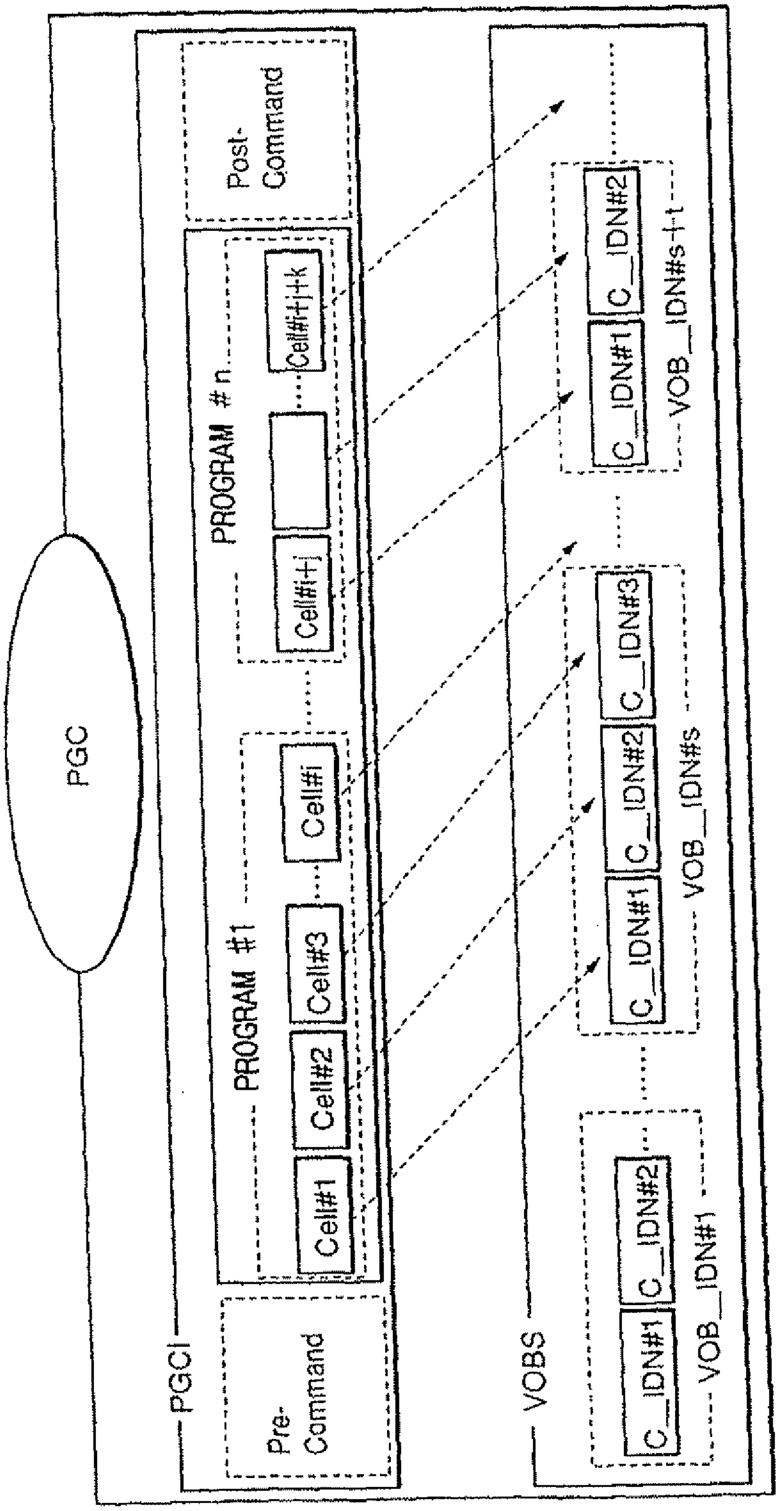

PGC
PGCI
Pre-Command
PROGRAM #1
Cell#1
Cell#2
Cell#3
Cell#i
PROGRAM # n
Cell#i+j
Cell#i+j+k
Post-Command
VOBS
C_IDN#1
C_IDN#2
VOB_IDN#1
C_IDN#1
C_IDN#2
C_IDN#3
VOB_IDN#s
C_IDN#1
C_IDN#2
VOB_IDN#s+t

FIG. 5

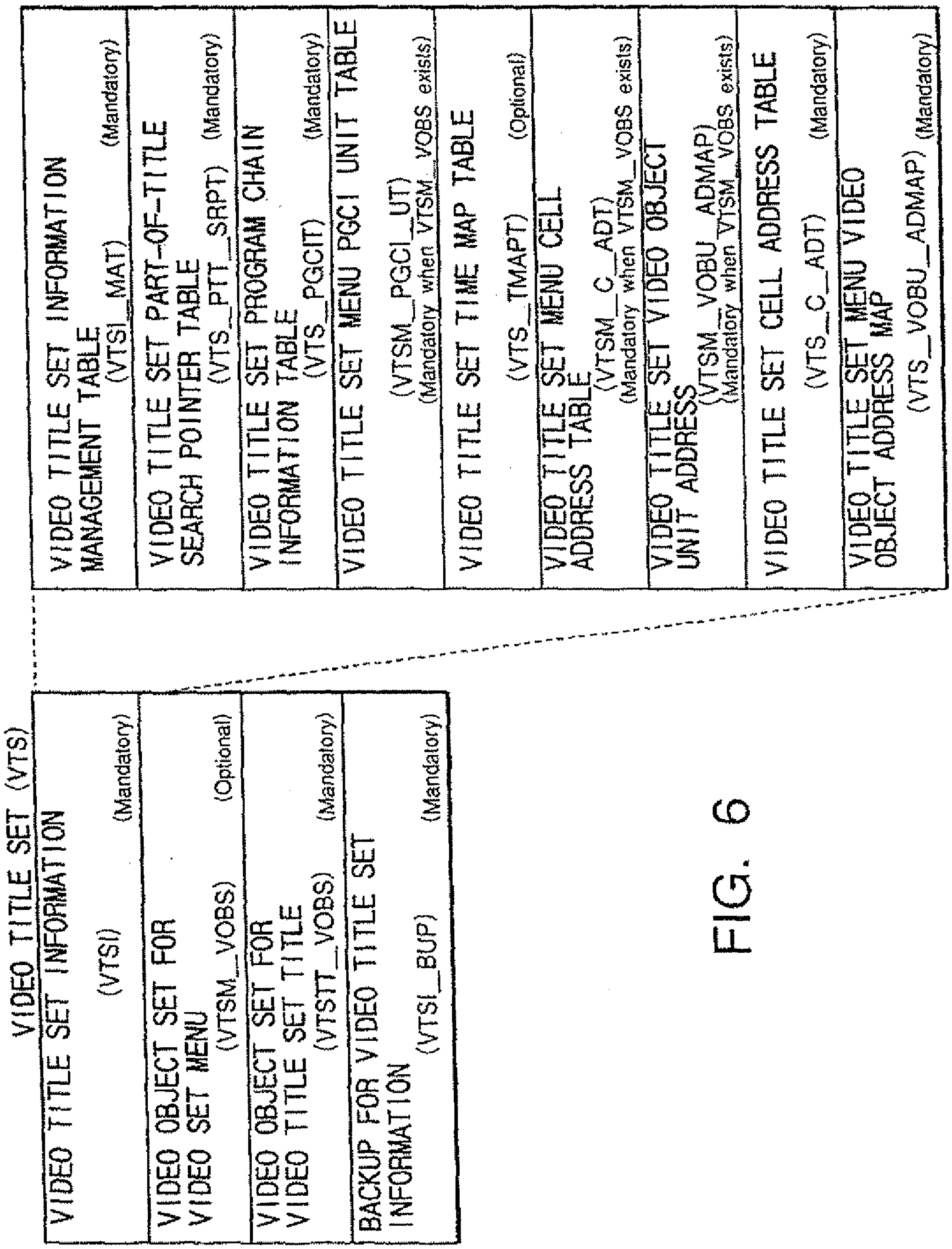

VIDEO TITLE SET (VTS)
VIDEO TITLE SET INFORMATION (VTSI) (Mandatory)
VIDEO OBJECT SET FOR VIDEO SET MENU (VTSM_VOBS) (Optional)
VIDEO OBJECT SET FOR VIDEO TITLE SET TITLE (VTSTT_VOBS) (Mandatory)
BACKUP FOR VIDEO TITLE SET INFORMATION (VTSI_BUP) (Mandatory)
VIDEO TITLE SET INFORMATION MANAGEMENT TABLE (VTSI_MAT) (Mandatory)
VIDEO TITLE SET PART-OF-TITLE SEARCH POINTER TABLE (VTS_PTT_SRPT) (Mandatory)
VIDEO TITLE SET PROGRAM CHAIN INFORMATION TABLE (VTS_PGCIT) (Mandatory)
VIDEO TITLE SET MENU PGCI UNIT TABLE (VTSM_PGCI_UT) (Mandatory when VTSM_VOBS exists)
VIDEO TITLE SET TIME MAP TABLE (VTS_TMAPT) (Optional)
VIDEO TITLE SET MENU CELL ADDRESS TABLE (VTSM_C_ADT) (Mandatory when VTSM_VOBS exists)
VIDEO TITLE SET VIDEO OBJECT UNIT ADDRESS (VTSM_VOBU_ADMAP) (Mandatory when VTSM_VOBS exists)
VIDEO TITLE SET CELL ADDRESS TABLE (VTS_C_ADT) (Mandatory)
VIDEO TITLE SET MENU VIDEO OBJECT ADDRESS MAP (VTS_VOBU_ADMAP) (Mandatory)

FIG. 6

VIDEO TITLE SET INFORMATION MANAGEMENT TABLE
VTSI_MAT

RBP		DESCRIPTION	NO. OF BYTES
0~11	VTS_ID	VTS IDENTIFICATION	12
12~15	VTS_EA	VTS END ADDRESS	4
16~27	RESERVED	RESERVED	12
28~31	VTSI_EA	VTSI END ADDRESS	4
⋮	⋮	⋮	
⋮	⋮	⋮	
⋮	⋮	⋮	
514~515	VTS_AST_Ns	NUMBER OF AUDIO STREAMS IN VTS	2
516~579	VTS_AST_ATRT	AUDIO STREAM ATTRIBUTE TABLE FOR VTS	64
580~595	RESERVED	RESERVED	16
596~597	VTS_SPST_Ns	NUMBER OF SUB-PICTURE STREAMS IN VTS	2
598~789	VTS_SPST_ATRT	SUB-PICTURE STREAM ATTRIBUTE TABLE FOR VTS	192
⋮	⋮	⋮	

FIG. 7

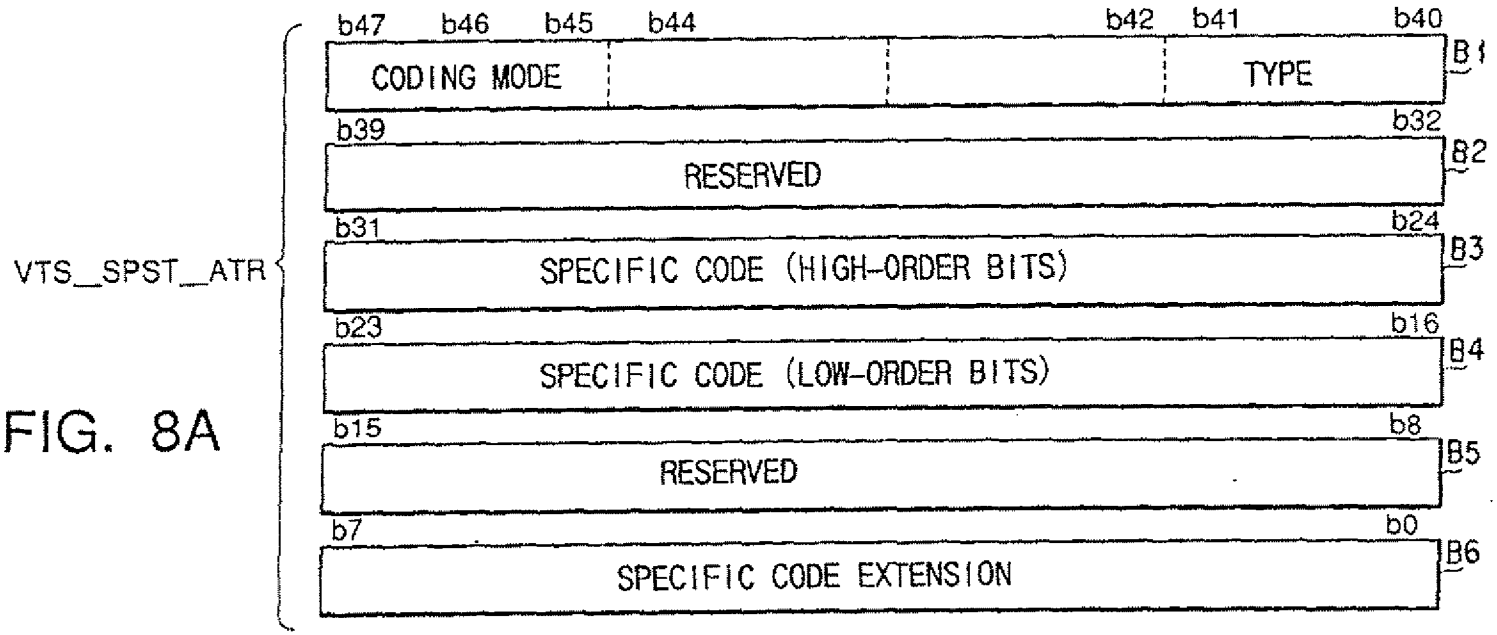


FIG. 8A

FIG. 8B

TYPE (2 BITS)	DESCRIPTION
00	NO LANGUAGE DETERMINED
10	LANGUAGE DETERMINED

DEFINITION OF SPECIFIC CODE FIELD (NORMAL)

HIHG-ORDER BITS	LOW-ORDER BITS	LANGUAGE
CODE OF THE FIREST LETTER OF LANGUAGE SYMBOL	CODE OF THE SECOND LETTER OF LANGUAGE SYMBOL	LANGUAGE DETERMINED IN ISO-639

FIG. 9A

DEFINITION OF SPECIFIC CODE FIELD (ADDITIONAL)

HIGH-ORDER BITS	LOW-ORDER BITS	LANGUAGE
FFh	00h	TAIWANESE
	01h	CANTONESE
	02h	etc.
	03 to FFh	RESERVED

FIG. 9B

CODE EXTENSION TABLE FOR SUB-PICTURE STREAMS

8BITS CODE VALUE	DESCRIPTION
00h	NONE
01h	CAPTION IN STANDARD-SIZED CHARACTERS
02h	CAPTION IN LARGE-SIZED CHARACTERS
03h	CAPTION FOR CHILDREN
04h	RESERVED
05h	CLOSED CAPTION IN STANDARD-SIZED CHARACTERS
06h	CLOSED CAPTION IN LARGE-SIZED CHARACTERS
07h	CLOSED CAPTION FOR CHILDREN
08h	RESERVED
09h	MANDATORY CAPTION
0Ah	RESERVED
0Bh	RESERVED
0Ch	RESERVED
0Dh	DIRECTOR'S COMMENTS IN STANDARD-SIZED CHARACTERS
0Eh	DIRECTOR'S COMMENTS IN LARGE SIZE
0Fh	DIRECTOR'S COMMENTS FOR CHILDREN
10h~7Fh	RESERVED
80h~FFh	DEFINITIONS MADE BY PRODUCER

FIG. 10

EXAMPLE OF SUB-PICTURE STREAMS A

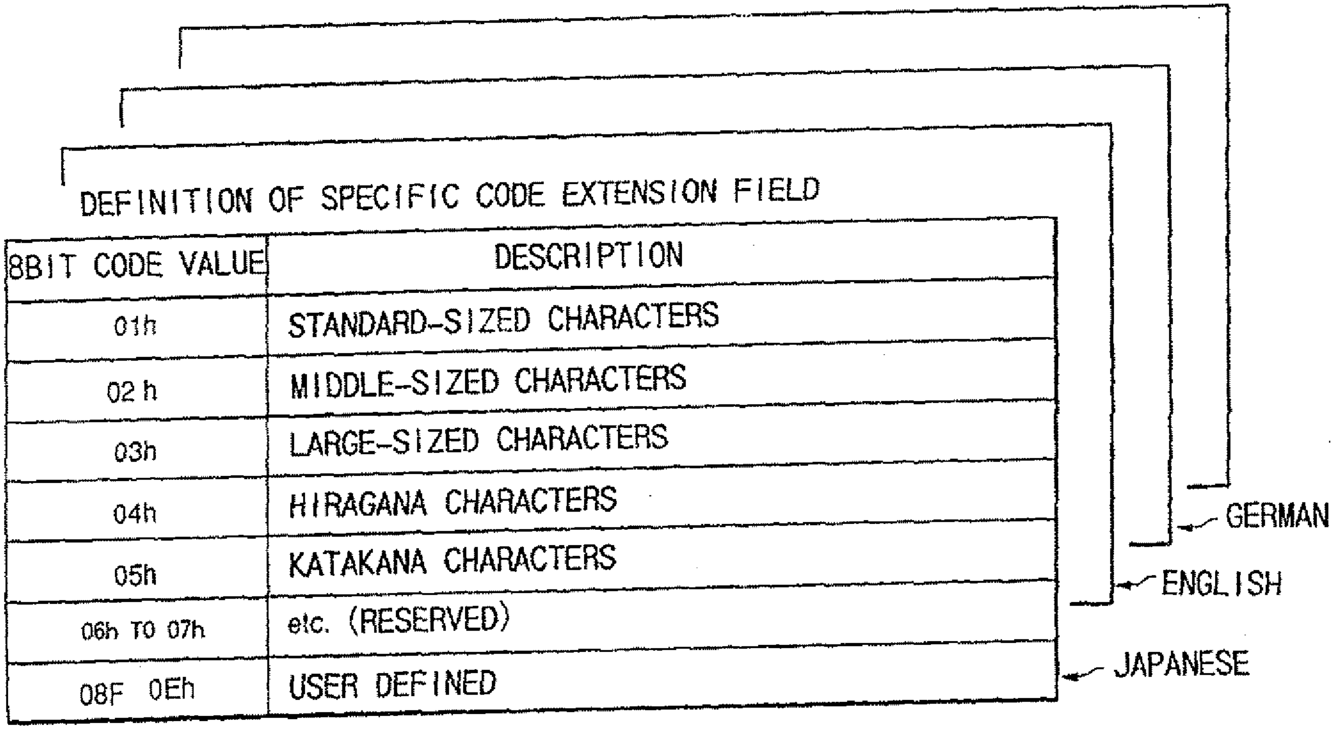
	TYPE	SPECIFIC CODE	SPECIFIC CODE EXTENSION
STREAM NO. 0	10 (LANGUAGE)	en (ENGLISH)	01h (NORMAL CHARACTERS)
STREAM NO. 1	10 (LANGUAGE)	en (ENGLISH)	02h (LARGE-SIZED CHARACTERS)
STREAM NO. 2	10 (LANGUAGE)	ja (JAPANESE)	01h (NORMAL CHARACTERS)
STREAM NO. 3	10 (LANGUAGE)	ja (JAPANESE)	02h (LARGE-SIZED CHARACTERS)

FIG. 11A

EXAMPLE OF SUB-PICTURE STREAMS B

	TYPE	SPECIFIC CODE	SPECIFIC CODE EXTENSION
STREAM NO. 0	10 (LANGUAGE)	ja (JAPANESE)	01h (NORMAL CHARACTERS)
STREAM NO. 1	10 (LANGUAGE)	en (ENGLISH)	01h (NORMAL CHARACTERS)
STREAM NO. 2	10 (LANGUAGE)	ja (JAPANESE)	02 (LARGE-SIZED CHARACTERS)
STREAM NO. 3	10 (LANGUAGE)	ja (JAPANESE)	03h (CHARACTER FOR CHILDREN)

FIG. 11B



DEFINITION OF SPECIFIC CODE EXTENSION FIELD

8BIT CODE VALUE	DESCRIPTION
01h	STANDARD-SIZED CHARACTERS
02 h	MIDDLE-SIZED CHARACTERS
03h	LARGE-SIZED CHARACTERS
04h	HIRAGANA CHARACTERS
05h	KATAKANA CHARACTERS
06h TO 07h	etc. (RESERVED)
08F 0Eh	USER DEFINED

FIG. 12

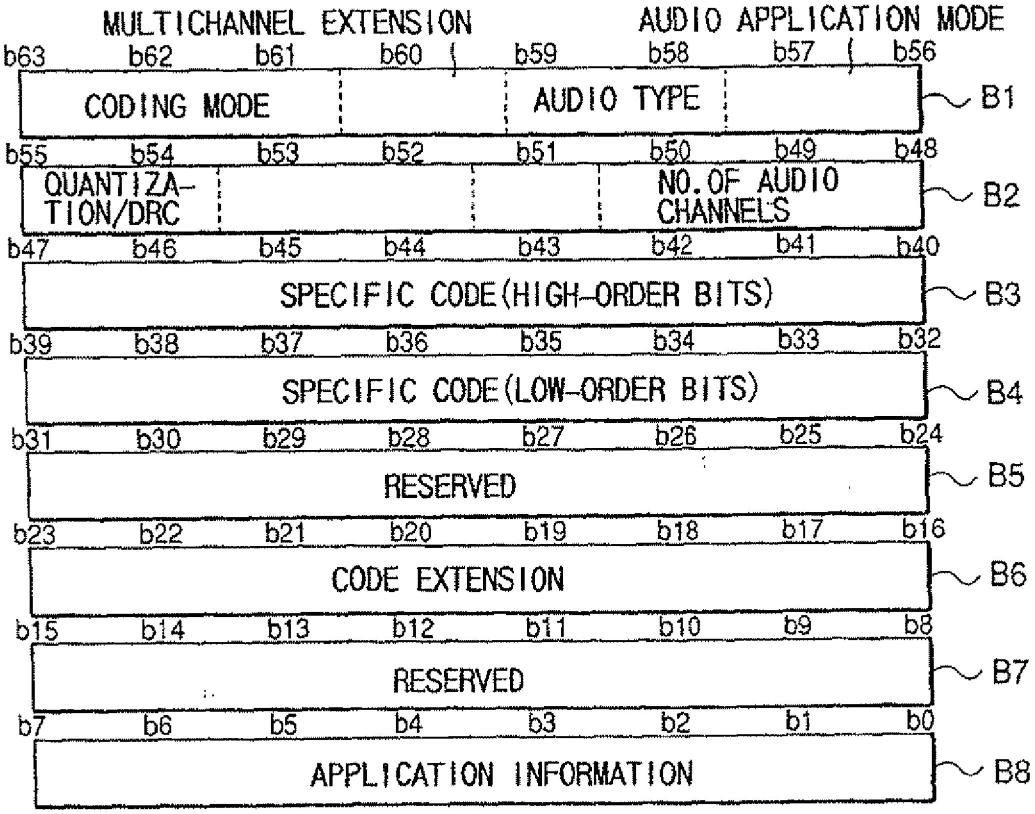

MULTICHANNEL EXTENSION
AUDIO APPLICATION MODE
b63 b62 b61 b60 b59 b58 b57 b56
CODING MODE
AUDIO TYPE
B1
b55 b54 b53 b52 b51 b50 b49 b48
QUANTIZA-TION/DRC
NO. OF AUDIO CHANNELS
B2
b47 b46 b45 b44 b43 b42 b41 b40
SPECIFIC CODE (HIGH-ORDER BITS)
B3
b39 b38 b37 b36 b35 b34 b33 b32
SPECIFIC CODE (LOW-ORDER BITS)
B4
b31 b30 b29 b28 b27 b26 b25 b24
RESERVED
B5
b23 b22 b21 b20 b19 b18 b17 b16
CODE EXTENSION
B6
b15 b14 b13 b12 b11 b10 b9 b8
RESERVED
B7
b7 b6 b5 b4 b3 b2 b1 b0
APPLICATION INFORMATION
B8

FIG. 13

CODE EXTENSION TABLE FOR AUDIO STREAMS

8BIT CODE VALUE	DESCRIPTION
00h	NONE
01h	STANDARD CAPTION
02h	SPEECH FOR VISUALLY HANDICAPPED PERSONS
03h	DIRECTOR'S COMMENTS (1)
04h	DIRECTER'S COMMENTS (2)
05h TO 7Fh	RESERVED
80h TO FFh	DEFINITIONS MADE BY PRODUCER

FIG. 14

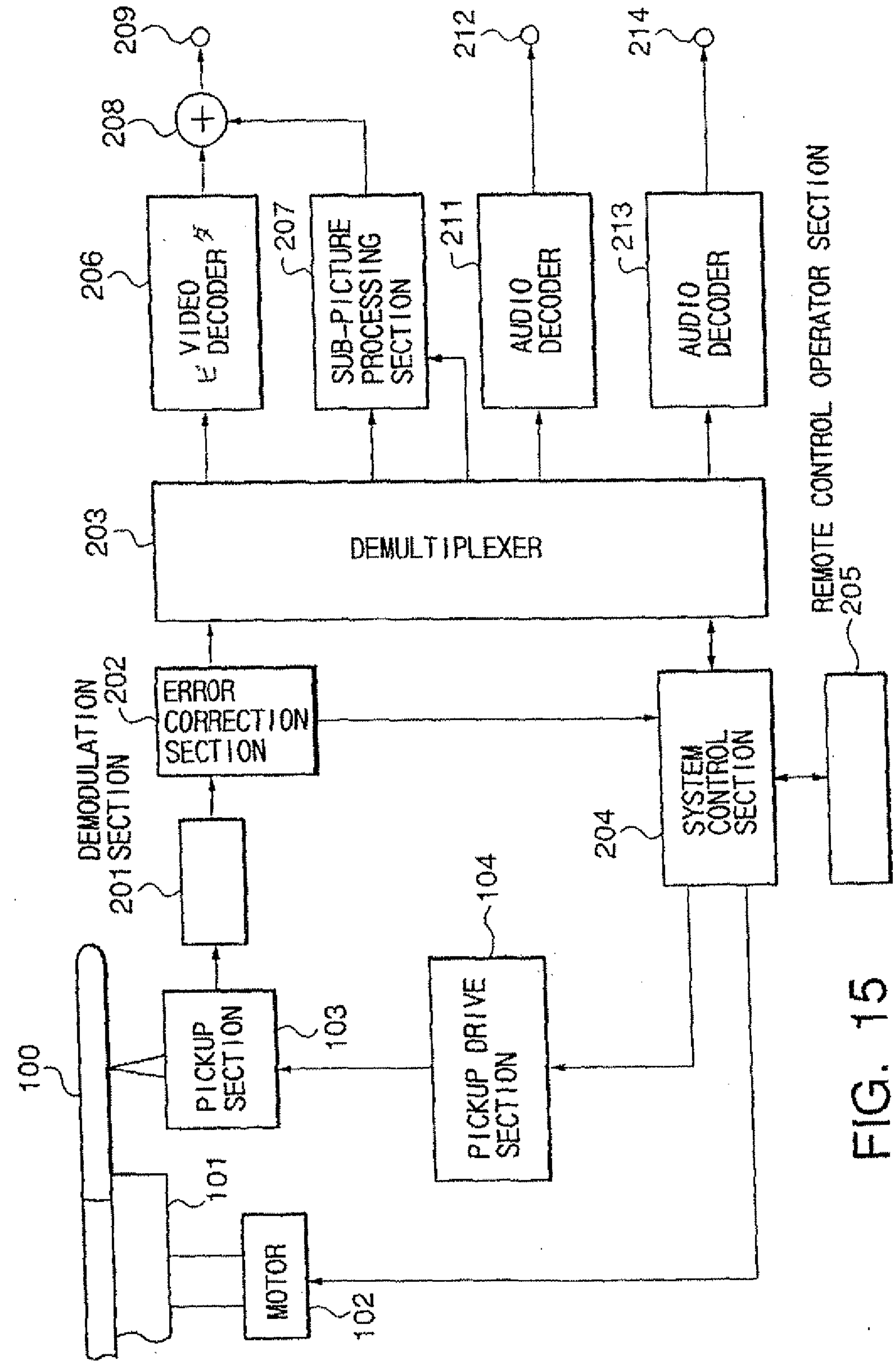

PICKUP SECTION
MOTOR
PICKUP DRIVE SECTION
DEMODULATION SECTION
ERROR CORRECTION SECTION
DEMULTIPLEXER
SYSTEM CONTROL SECTION
REMOTE CONTROL OPERATOR SECTION
VIDEO DECODER
SUB-PICTURE PROCESSING SECTION
AUDIO DECODER
AUDIO DECODER

FIG. 15

MENU SCREEN

STREAM NO.0	ENGLISH	NORMAL SIZE
STREAM NO.1	ENGLISH	LARGE SIZE
STREAM NO.2	JAPANESE	STANDARD SIZE
STREAM NO.3	JAPANESE	LARGE-SIZED CHARACTERS

FIG.16A

MENU SCREEN

STREAM NO.0	JAPANESE	STANDARD SIZE
STREAM NO.1	ENGLISH	NORMAL SIZE
STREAM NO.2	JAPANESE	LARGE-SIZED CHARACTERS
STREAM NO.3	JAPANESE	CHARACTER FOR CHILDREN

FIG.16B

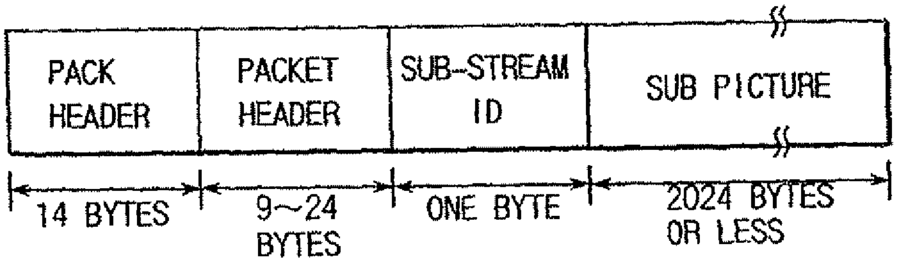


FIG.18

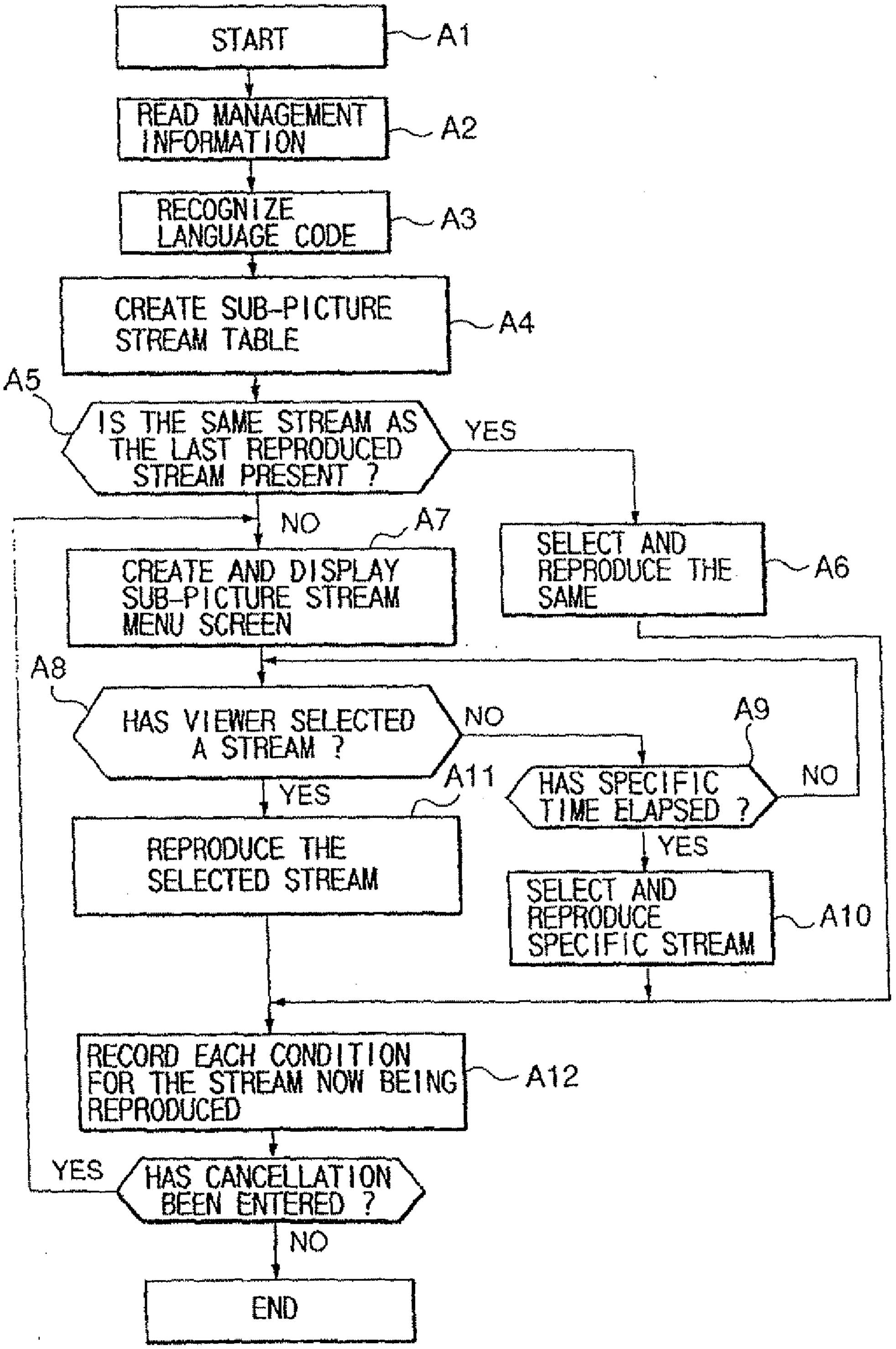

START
A1
READ MANAGEMENT INFORMATION
A2
RECOGNIZE LANGUAGE CODE
A3
CREATE SUB-PICTURE STREAM TABLE
A4
A5
IS THE SAME STREAM AS THE LAST REPRODUCED STREAM PRESENT ?
YES
NO
A7
CREATE AND DISPLAY SUB-PICTURE STREAM MENU SCREEN
SELECT AND REPRODUCE THE SAME
A6
A8
HAS VIEWER SELECTED A STREAM ?
NO
A9
HAS SPECIFIC TIME ELAPSED ?
NO
YES
A11
REPRODUCE THE SELECTED STREAM
YES
SELECT AND REPRODUCE SPECIFIC STREAM
A10
RECORD EACH CONDITION FOR THE STREAM NOW BEING REPRODUCED
A12
YES
HAS CANCELLATION BEEN ENTERED ?
NO
END

FIG. 17

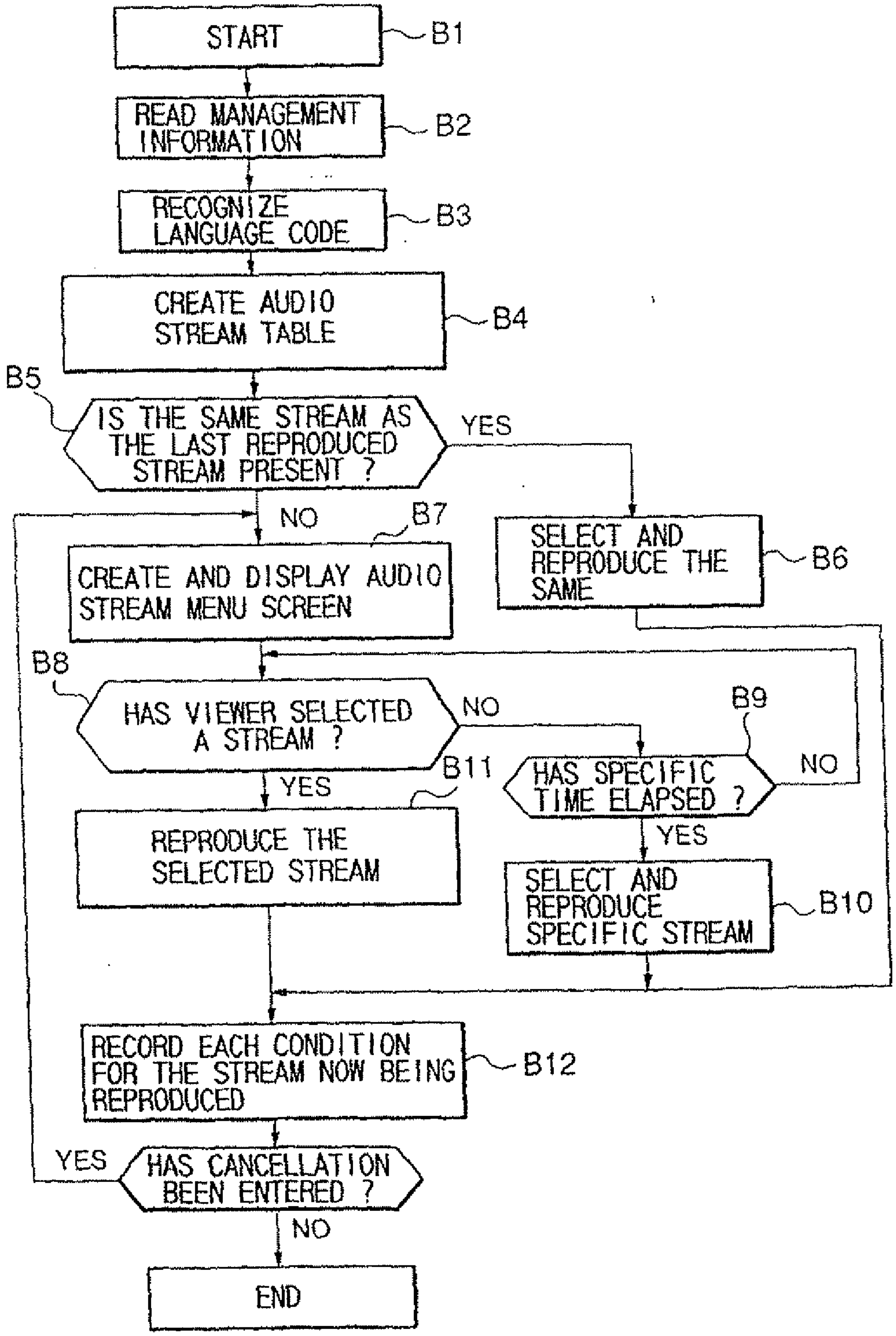

START
B1
READ MANAGEMENT INFORMATION
B2
RECOGNIZE LANGUAGE CODE
B3
CREATE AUDIO STREAM TABLE
B4
B5
IS THE SAME STREAM AS THE LAST REPRODUCED STREAM PRESENT ?
YES
NO
SELECT AND REPRODUCE THE SAME
B6
B7
CREATE AND DISPLAY AUDIO STREAM MENU SCREEN
B8
HAS VIEWER SELECTED A STREAM ?
NO
B9
HAS SPECIFIC TIME ELAPSED ?
NO
YES
B11
REPRODUCE THE SELECTED STREAM
SELECT AND REPRODUCE SPECIFIC STREAM
B10
RECORD EACH CONDITION FOR THE STREAM NOW BEING REPRODUCED
B12
YES
HAS CANCELLATION BEEN ENTERED ?
NO
END

FIG. 19

STREAM NO.0	ENGLISH	NORMAL SIZE
STREAM NO.1	ENGLISH	LARGE SIZE
STREAM NO.2	JAPANESE	STANDARD-SIZED CHARACTERS
STREAM NO.3	JAPANESE	LARGE-SIZED CHARACTERS
STREAM NO.4	JAPANESE	HARAGANA CHARACTERS
STREAM NO.5		
STREAM NO.6		
STREAM NO.7		

FIG. 20

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP96/03429

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl^6 G11B27/00, G11B20/12, H04N5/91

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int. Cl^6 G11B27/00, G11B20/12, H04N5/91

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1926 - 1996
Kokai Jitsuyo Shinan Koho	1971 - 1996
Toroku Jitsuyo Shinan Koho	1994 - 1996

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

96938526.9

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP, 5-46624, A (Sony Corp.), February 26, 1993 (26. 02. 93) (Family: none)	1 - 13

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search January 6, 1997 (06. 01. 97)	Date of mailing of the international search report January 21, 1997 (21. 01. 97)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 1992)